Regional Information Report No. 1J11-14

A Program for Improving Management and Research of Fisheries in the Southeast Region

by

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Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, Special Publications and the Division of Commercial Fisheries Regional Reports. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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The Regional Information Report Series was established in 1987 and was redefined in 2007 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.sf.adfg.ak.us/statewide/divreports/htlm/intersearch.cfm.

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ABSTRACT

This report summarizes research and management information gaps and projects to address those gaps for commercial, personal use, and subsistence fisheries in Southeast Alaska. Projects identified in this document are currently unfunded or underfunded. If fully funded these projects would contribute significantly to the knowledge base for the species associated with each project and in many cases facilitate management of abundance-based fisheries that exploit those stocks.

Key words: Blue Book, management, Southeast Alaska, stock assessment, fisheries.

INTRODUCTION

The Southeast Alaska/Yakutat Region (Region I) consists of Alaska waters between Cape Suckling on the north and Dixon Entrance on the south. Region I is divided into two registration areas. Registration Area A, the Southeast Alaska area, extends from Dixon Entrance to Cape Fairweather. The Southeast Alaska area is divided into 17 regulatory districts, Districts 1 through 16 and the Dixon Entrance District. Registration Area A districts are further divided into regulatory sections and statistical areas. Registration Area D, the Yakutat area, extends from Cape Fairweather to Cape Suckling. The Yakutat area is further divided into the Yakutat District, extending from Cape Fairweather to Icy Cape, and the Yakataga District extending westward from Icy Cape to Cape Suckling.

For management and administrative purposes, Region I is divided into six management areas with area offices in Juneau, Ketchikan/Craig, Petersburg/Wrangell, Sitka, Haines, and Yakutat. The Craig office is seasonally staffed.

The Division of Commercial Fisheries is charged with management of not only commercial fisheries in Southeast Alaska but also subsistence and personal use fisheries that are of significant importance to the residents of the region. Southeast Alaska's commercial fisheries are diverse, valuable, harvest a variety of finfish and shellfish species, and include both large and small vessels. The approximate total ex-vessel value of commercial fisheries in Southeast Alaska was approximately $145.6 million in 2010.

FISHERIES MANAGEMENT ORGANIZATION

Management of the Region I commercial, subsistence, and personal use fisheries is accomplished in a closely coordinated manner. There are six area management biologists in Region I, corresponding to the area offices. Management biologists with area responsibilities oversee the commercial salmon net (purse seine, drift and set gillnet), herring, pot shrimp, miscellaneous dive, and the subsistence/personal use fisheries in their respective areas. Management biologists with regional responsibilities oversee the groundfish, crab, shrimp beam trawl, and salmon troll fisheries. The closely coordinated regional management approach for fisheries is because of the spatial and temporal movement of fish and fishers between the various management areas.

OVERVIEW

Salmon

Commercial utilization of the Region I salmon resources began in the late 1870s. Until the early 1900s, sockeye salmon was the primary species harvested. Pink salmon began to dominate the harvest in the early 1900s and in the past ten years have comprised 51 to 84% of the region's

total salmon harvest. The relative order of production (in numbers of fish) from highest to lowest is generally pink, chum, coho, sockeye, and Chinook salmon.

The harvest of salmon in Region I peaked in the late 1930s and early 1940s and declined to historical low levels in the 1950s and early 1960s. During the mid to late 1960s, harvests increased, but in the early 1970s, another decline in production occurred. Since the mid 1970s, salmon production levels in Region I have generally been increasing with record harvests of Chinook (2004), sockeye (1993), coho (1994), pink (1999), and chum salmon (1996) occurring in recent years. The total Region I commercial salmon harvest in 2010 was approximately 37.1 million fish.

The Region I cumulative commercial salmon harvest by all gear types, including hatchery cost recovery, totaled approximately 37.1 million fish in 2010. This total was well below the recent 10-year average of 54.7 million fish. The Region I total commercial salmon harvest percentage consisted of Chinook (1%), sockeye (2%), coho (7%), pink (65%), and chum (25%) salmon. The 2010 total Chinook salmon harvest of 255,000 fish was well below average. The 718,000 sockeye harvested was about half the 10-year average. The coho harvest of about 2.5 million fish was slightly below the 10-year average. The pink harvest of 24.2 million fish was well below the recent 10-year average of about 40 million fish. The chum harvest of 9.4 million fish was also slightly below the recent 10-year average

Salmon landed by purse seiners accounted for 79% of the total salmon harvest, followed by drift gillnetters (14%), trollers (5%) and setnetters 1%. Approximately 11% of the Chinook and 35% of the chum salmon harvest was taken in hatchery cost recovery fisheries.

Herring

Pacific herring are found throughout Region I. The spawning aggregates vary greatly in size and productivity. Herring are harvested in commercial bait, sac roe, spawn-on-kelp, and bait pound fisheries. In the Yakutat area the only commercial herring fishery allowed by regulation is a winter bait fishery. Subsistence and personal use harvesting of herring and herring spawn-on-kelp and spawn-on-branches occurs in both areas.

Prior to 1967 most of the region's harvest was taken in a commercial reduction fishery with a historic peak harvest of 79,700 tons in 1929; this fishery typically harvested mixed stocks of feeding herring during the summer months for reduction to meal and oil. A commercial winter bait fishery has occurred annually since the turn of the century and has historically supplied most of the bait for Alaskan commercial longline and pot fisheries. Harvests in this fishery are taken by purse seine gear during the fall and winter months, when bait quality is best, on discrete wintering schools in major bays and inlets. Since statehood, annual winter bait harvests have ranged from 460 tons to 6,400 tons.

Sac roe fisheries began to dominate the Southeast industry beginning in 1971. Sac roe fisheries are held in the spring immediately prior to spawning when egg maturity is highest. Southeast Alaska commercial sac roe fisheries are limited entry fisheries, with two exclusive purse seine areas (Sitka Sound and Lynn Canal), two exclusive set gillnet areas (Kah Shakes/Cat Island and Seymour Canal), and the Hobart Bay/Port Houghton fishery area where a herring gillnet sac roe fishery is allowed if the winter bait fishery does not harvest the entire guideline harvest level (GHL). The Sitka Sound purse seine sac roe fishery is the largest herring fishery in the region, with annual harvests during the 1980–2011 seasons ranging from 1,900 tons to 19,800 tons.

During the January 2003 meeting, the Board of Fisheries adopted regulations allowing a sac roe fishery in West Beam Canal, near Ketchikan. This fishery is unique to Southeast herring fisheries because allowable gear types will alternate between purse seine and set gillnet each fishery. The Lynn Canal purse seine fishery has been closed since 1982 due to low stock abundance. Since 1980, sac roe harvests in the combined gillnet areas have ranged from 300 tons to 3,300 tons.

Two herring spawn-on-kelp pound fisheries developed in the early 1990s in the Hoonah Sound and Craig/Klawock areas. The spawn-on-kelp fisheries became limited entry fisheries in 1995. In January 2003, the Board of Fisheries adopted regulations creating spawn-on-kelp fisheries in Tenakee Inlet and Ernest Sound. Herring mortality in spawn-on-kelp fisheries is probably lower than other fisheries, as herring are released after spawning and the value of the fishery is derived from eggs deposited on suspended kelp blades.

Fresh bait and tray pack bait pounds are allowed under a permit system in Southeast, but very little harvest has occurred in these fisheries during the last two decades (0 to 80 tons annually). Growing interest in bait pound fishing opportunities lead the Board of Fisheries to modify regulations during the January 2003 meeting, by combining fresh bait and tray pack seasons, quotas and use descriptions to allow greater flexibility to participate in these fisheries.

Ground Fish

The Eastern Gulf of Alaska regulatory area for groundfish management encompasses all waters surrounding the Alexander Archipelago from Dixon Entrance ($54^{o}30'$ N. latitude) northwestward along the outer coast to 144^{o} W. longitude.

The Alaska Department of Fish and Game has management jurisdiction over all groundfish resources within state waters in the Eastern Gulf of Alaska area. State waters include all internal waters of Southeast Alaska and Yakutat Bay, and waters within three miles of shore along the outer coast. Additionally, a provision in the Gulf of Alaska Groundfish Fisheries Management Plan (FMP) authorizes the state to execute inseason management of Demersal shelf rockfish (DSR) in both state and federal waters in the Southeast Outside (SEO) Subdistrict (outer coastal waters east of 140° W. longitude). Lingcod is under state jurisdiction in both state and federal waters east of 147° W. longitude because lingcod is not defined as a groundfish under the FMP. In 1999, the North Pacific Fisheries Management Council (NPFMC) removed black and blue rockfish from the FMP. The State of Alaska now has sole management and assessment responsibilities for these species.

Seven groundfish management areas have been established in Southeast Alaska. Four of the areas, Eastern Yakutat (EYKT) section, Northern Southeast Outside (NSEO) section, Central Southeast Outside (CSEO) section, and Southern Southeast Outside section (SSEO), are along the outer coast and make up the Southeast Outside (SEO) subdistrict. The Icy Bay Subdistrict (IBS) section encompasses Yakutat Bay and waters between 140° and 144° W longitude. The remaining two areas, Northern Southeast Inside (NSEI) subdistrict and Southern Southeast Inside (SSEI) subdistrict, are in internal waters.

The primary state-managed fisheries that have occurred in the region include sablefish, rockfish, lingcod, Pacific cod, and starry flounder. By regulation, sablefish can be fished only with longline and pot gear, and state-managed rockfish and lingcod fisheries are restricted to hook and line gear in the Southeast District. Fisheries targeting on sablefish and DSR almost exclusively

use longline gear and directed lingcod fisheries use primarily dinglebar troll gear. Flatfish are harvested with beam-trawl gear.

Sablefish have been harvested in the internal waters of Southeast Alaska since the early 1900s. The fishery is split into two areas: The NSEI area, where fishing occurs mostly in Chatham Strait, and the SSEI area, including Clarence Strait and adjacent waters of Dixon Entrance. Prior to the 1940s, sablefish were primarily landed as incidental catch in the halibut fishery. Halibut longline gear was modified in the late 1940s to specifically target sablefish. Pot gear was first introduced in 1970 in the SSEI and Dixon Entrance, accounting for 33% of the harvest in the early 1970s. By 1979, pot gear was responsible for less than 5% of the catch. Harvest levels fluctuated widely until the 1970s due to price and more opportunities in other fisheries.

The second most valuable groundfish fishery in Southeast is the DSR fishery with 2007 landings totaling more than 498,000 pounds worth an exvessel value of about $488,000. DSR is a management assemblage with six species of rockfishes, with yelloweye rockfish accounting for 96% of the catch. DSR have been the target of a directed shore-based longline fishery in Southeast Alaska since the late 1970s.

Lingcod is another important target fishery, with over 229,000 pounds of fish landed in 2007, with an exvessel value of $305,000. Lingcod have traditionally been an important bycatch species in the rockfish longline fishery and in the salmon troll fishery, as well as bycatch in the halibut fishery and taken in subsistence and recreational fisheries. The directed commercial fishery for lingcod developed in 1987 off the outer coast of Kruzof Island in CSEO and has increased in importance and presence since that time. The peak directed fishery harvest occurred in 1995, with 653,228 pounds taken. The total harvest of lingcod was highest in 1991, with 960,378 pounds landed by all gears.

Miscellaneous Shellfish

Several commercially important miscellaneous shellfish species are found in the Southeast/Yakutat Region. These species, also known as the “dive fisheries”, include sea cucumbers, sea urchins, geoducks and abalone, and are found primarily in southern waters of Area A. This is especially true of sea urchins, geoducks and abalone, which thrive in sub tidal waters exposed to open ocean. Sea cucumbers exist in a broader range of habitats and are found in both exposed and inland waters. Sea cucumbers, sea urchins and geoducks currently support important commercial dive fisheries within the region with primary markets in Japan and Asia. These fisheries have developed over the past decade and are considered nearly fully developed. Abalone stocks are in a recovery phase and commercial harvest is prohibited. Subsistence and personal use harvest of miscellaneous shellfish occurs to an unknown extent.

Southeast dive fisheries are relatively recent entrants into the region’s commercial fishing industry. The first commercial landings for abalone occurred in the mid 1960s, and red sea urchins, sea cucumbers, and geoduck clams in the early to mid 1980s. Participation in each fishery was often limited to just one or two divers initially and only recently has expanded to current effort levels

Commercial harvest of abalone (*Haliotis kamschatkana*) began with a boom in effort and landings followed by a rapid decline in stocks. The marked increase in harvests and effort came in the 1978/79 season, when effort increased more than three-fold and harvests jumped to 180,000 lbs from a long-term average of about 6,000 lbs. Harvests peaked at 378,685 lbs in the

next season, the first of the seasonal accounting year. This peak exceeded the quota of 250,000 lbs, which the Alaska Board of Fisheries adopted in the spring of 1980, and the fishery was closed by emergency order for the first time. High harvests continued through the 1981/82 season when 371,000 lbs were landed, despite a further reduction in the guideline harvest range (GHR) to a maximum of 125,000 lbs and a season shortened to two months. By the 1984/85 season, it was apparent that the resource was in trouble, when the lower end of the GHR (86,000 lbs) was not reached despite 151 days of fishing. The 1990/91 through 1995/96 seasons opened on October 1, and with the exception of District 13, which is managed separately and closed by emergency order, the length of the season for the rest of southeast Alaska was set prior to the opening to avoid over harvest. By the end of the 1995/96 season only 5,800 lbs were harvested and the season was not reopened in 1996/97.

The sea cucumber (*Parastichopus californicus*) fishery expanded rapidly in the late 1980s and in 1989 the fishery exceeded the ability of the department to manage by the permit system. The department closed the fishery in May 1990 and reopened it in October 1990 following development of the Southeast Alaska Sea Cucumber Commercial Fisheries Management Plan (5 AAC 38.140). This plan seeks to protect subsistence opportunities and provides for sustained commercial fishing harvests. To protect subsistence opportunities, the cucumber management plan established 15 areas closed to commercial fishing (5 AAC 38.140 (k)). There are also provisions to prevent the use of diving gear in the subsistence (5 AAC 02.010 (1)) and personal use (5 AAC 77.010 (l)(3)) fisheries in those areas.

Although interest in sea urchins began with green sea urchins (*Strongylocentrotus droebachiensis*), a red sea urchin (*S. franciscanus*) fishery has developed in Southeast Alaska as an alternative, due to lack of commercially viable green sea urchin populations. Both green and red sea urchins were harvested sporadically beginning in the mid1980s. Interest in Alaska product peaked in the mid-1990s in response to success in California and Washington fisheries. The red sea urchin fishery developed rapidly during the 199596 fishing season, with a cooperative effort between the Alaska Department of Fish and Game and industry representatives. A major test fishery was conducted during those years, which involved harvest of approximately 3 million pounds of red sea urchins in exchange for funds to begin an annual stock assessment program. Interest in red sea urchins began in the Sitka area, however, now sea urchin harvest is limited to fishing districts 101-104. The increasing geographic range and abundance of sea otters following their reintroduction in Southeast Alaska in the mid 1960s has dramatically reduced the extent of commercially viable populations of red sea urchins on the outer coast. Significant geographic expansion of the red urchin fishery is not anticipated. Poor market conditions have depressed the sea urchin fishery and the annual quota has not been achieved for the past several years. Due to a lack of local processor interest, sea urchin harvests since 2006 have been very limited.

The geoduck (*Panopea abrupta*) is the largest clam in the Pacific Northwest, widely distributed from Alaska through Washington State where they are very abundant in Puget Sound. Southeast Alaska is at the extreme northern limit of the geographic range and relatively little is known about the stock structure of geoduck clams in Southeast Alaska. Known geoduck clam beds have a patchy distribution in the central and southern portions of Southeast Alaska, primarily in protected waters near the outside coast. Studies conducted in Washington State, British Columbia and more recently in Southeast Alaska indicate this clam may live to be over 100-years old. Southeast Alaska is the extreme northern limit of the geographic range of this species

and recruitment is sporadic or very low seasonally. Sporadic recruitment, low growth rates, and high maximum age make this species susceptible to over harvest.

A troubling problem is the tendency for geoduck clams to bioaccumulate undesirable micro-organisms or compounds. In particular, high levels of paralytic shellfish poisoning (PSP) have been found in geoducks in Southeast Alaska, most strongly associated with the viscera. However, the mantle and necks are the usual body parts consumed and PSP concentrations are lower in these parts. Though this situation permits the sale of processed clams with viscera removed, exvessel value for processed clams is significantly less than that for whole, live product. The Alaska Board of Fisheries adopted regulations during the January 2003 meeting that would allow the department to base management of the geoduck fishery on results of PSP tests conducted prior to harvest. At the request of commercial dive harvesters, during the 20032004 season, the department managed the fishery based on PSP test results in order to maximize the value of the fishery through shipment of live product.

In order to protect consumers, the state requires that commercially harvested clams be tested by the Alaska Department of Environmental Conservation (ADEC) and certified to be within acceptable levels of PSP prior to release for marketing. In addition, water quality for commercial beds is tested for human pathogenic microorganisms and certified safe by the ADEC.

One of the most notable impacts on the miscellaneous shellfish fisheries has been the formation of the Southeast Regional Dive Fishery Association (SARDFA) in February 1998. Industry divers in Southeast Alaska recognized the need for a mechanism of funding newly established dive fisheries, funding that the ADF&G was unable to provide. SARDFA was formed by legislative action (CSHB 198) to allow taxation of dive-harvested product, to be used primarily for funding management and research activities of dive fisheries. Prior to the SARDFA formation, funding of these fisheries was obtained through a combination of state general funds, volunteer contributions by industry processors and local municipalities, and test fishing conducted by the state. Currently, geoduck and sea urchin landings are assessed by SARDFA at 7% and sea cucumbers at 5%.

Shellfish

Shellfish fisheries in the Southeast Region target a diversity of species across all management areas from Ketchikan to Yakutat. The major shellfish fisheries occur in Area A, from Dixon Entrance to Cape Fairweather, and these include pot fisheries for spot and coonstripe shrimp, Tanner crab, red king crab, golden king crab, and Dungeness crab, as well as a long-standing beam trawl fishery for pink shrimp. Yakutat area fisheries, from Cape Fairweather to Cape Suckling, include pot fisheries for Tanner crab, Dungeness crab, and shrimp, as well as a trawl fishery for shrimp and a dredge fishery for scallops.

The major issues facing the region’s shellfish fisheries are fleet intensification, local depletion, and the resulting needs for better stock assessment information and for more and active management. Traditionally, the shellfish fisheries were managed with regional guideline harvest levels based on historical catch records. Those methods are largely inadequate now that our fleets have become larger and more efficient. As a consequence, the shellfish stocks have been fished hard, in some cases for decades. As fishing pressure has grown, the region’s shellfish stocks have seen depletion of local populations. This occurred in the past decade in the Yakutat area for both Dungeness and Tanner crabs, and those fisheries are closed to allow rebuilding to occur. Similar large scale closures of shellfish fisheries in Southeast Alaska are not anticipated;

however, local harvest and effort trends indicate our shellfish stocks require increasingly fine-scaled assessment and management to avoid depletions of local populations that can accumulate to force regional stock closures.

Another major issue, particularly for king crab and Tanner crab fisheries, is the industry's chronic lack of confidence in the department's survey and stock assessment program. This has been a serious challenge for the region's shellfish staff to overcome and it has been a roadblock to effective dialogue with participants in these fisheries. Management of these fisheries may be improved by finding ways to help the industry understand the value that the department places on fishery-independent survey programs and a movement toward abundance-based management.

FISHERY CHARACTERISTICS

Salmon

Salmon are commercially harvested in Southeast Alaska (Registration Area A) with purse seines and drift gillnets, in Yakutat (Registration Area D) with set gillnets, and in both areas with hand and power troll gear. The salmon net fisheries are confined to state waters. The troll fishery operates in both state waters and in the federal waters of the Exclusive Economic Zone (EEZ). The use of floating fish traps is restricted to the Annette Island Fishery Reserve, established by Presidential Proclamation in 1916; however, there have been no reported fish trap harvests since 1993.

Region I salmon fisheries are complex due to the mixed stock and mixed species nature of the returns and to the existence of several different gear groups that often harvest the same stocks of fish. Because the region contains approximately 5,500 salmon producing streams and tributaries of various productivity levels, it is difficult to apply stock specific fisheries management according to the run strength of individual returns. Additionally, some salmon harvested in the region originate from other states (primarily Washington and Oregon) and Canada.

The management of commercial salmon fisheries in Southeast Alaska depends heavily on inseason monitoring of salmon escapements to assess run strength. Harvest opportunities are allowed if and where salmon runs have a surplus to escapement needs. A large number of fisheries in the region are managed to harvest a share of the surplus of specific runs, under the terms of Pacific Salmon Treaty agreements. To manage accordingly, the department must be capable of projecting escapement, catch, and total run for individual stocks or stock groups. Additionally, accurate monitoring of escapements is critical for understanding production characteristics and setting escapement goals for salmon populations.

A variety of escapement monitoring techniques are used in the region. Aerial surveys are the major assessment tool used to provide indices of escapements of pink and chum salmon and to manage commercial purse seine fisheries, which primarily target these species. Aerial surveys are also important for indexing escapement levels for select coho and sockeye salmon systems, particularly in the Yakutat area. Monitoring of Chinook salmon systems in Southeast Alaska is often based on helicopter surveys, which are usually conducted by the Division of Sport Fish. Increasing fuel, insurance, and charter costs have resulted in a decrease in the number of streams monitored and frequency of aerial surveys in many areas. Operation of counting weirs in the region has declined in recent years due to budgetary limitations and the expense of such programs, despite the fact that in many cases weirs provide the most accurate estimates of escapement for clear water drainages, particularly for sockeye and coho salmon. Mark–recapture

techniques employing fish wheels are used to estimate escapements on large glacial systems in the region.

Herring

Southeast Alaska commercial herring fisheries are managed according to the Herring Management Plan for Statistical Area A, adopted by the Board of Fisheries in 1994. This plan directs the department to manage herring stocks on a spawning area basis, to establish minimum spawning biomass thresholds below which fishing is not allowed, to assess abundance of mature herring for each stock before allowing fishing to occur, to allow herring harvests at exploitation rates between 10% and 20% of the estimated spawning biomass when the biomass exceeds the minimum threshold level, to identify and consider other sources of mortality in setting harvest guidelines, and to modify fishing periods to minimize incidental mortalities during commercial fisheries.

Threshold levels represent a minimum herring biomass needed to allow commercial harvest, and have been established for each area where winter bait, sac roe, and spawn-on-kelp pound fisheries exist. In areas where spawning biomass meets or exceeds the threshold level, guideline harvest levels (GHLs) are established based on a graduated scale that allows for higher harvest rates as the herring population increases, reaching a maximum of 20% when the population is six-times the threshold level.

Herring populations are assessed annually to estimate herring spawning biomass. The department estimates spawning biomass using miles of shoreline receiving spawn (as documented using aerial and skiff surveys) and diver estimates of herring egg deposition on the spawning grounds. Spawning biomass is estimated as the product of estimated egg density and spawn mileage, with adjustments made for age composition and fecundity. For several major stocks, forecasts of the following year's spawning biomass are made using an age-structured analysis (ASA). This method applies estimates of recruitment, growth, maturation, and natural mortality to an estimate of spawning escapement from one year to forecast herring biomass for the next year.

Management of sac roe fisheries is very demanding due to short intense fishing periods during which the GHL can be taken in less than one hour. Harvests are timed to coincide with the brief period when roe quality and value is the highest. For this reason management is very intensive, and relies on frequent aerial and sonar surveys of schooling fish, test fishing, as well as close contact with industry to assess product quality prior to fishing. In years when demand for bait exceeds the GHLs, intensive on-the-grounds management can also be necessary in winter bait fisheries. Bait fisheries occur at night and close contact with industry is maintained via radio to assess harvest rates. Management of spawn-on-kelp pound fisheries also requires significant staff time and effort to monitor all aspects of the fishery. Due to the intensive nature of the fisheries and the need for extended periods of on-the-grounds management, costs of managing herring fisheries are frequently substantial.

Ground Fish

Management of the region's commercial groundfish fisheries is highly complicated because of the large number of species involved, area-specific directed fishery quotas, allocations between gear groups, and bycatch of species in fisheries targeting other species. Regulations approved by the Alaska Board of Fisheries provide specific guidance on fishing areas, seasons, gear, and allocative issues.

The department's goal for management of groundfish is to estimate biomass for each species harvested commercially and apply an appropriate harvest rate to this biomass to set catch levels. Although we have had assessment surveys for sablefish, lingcod, black rockfish, and DSR, the only populations for which we currently have biomass estimates of the stock are DSR and NSEI sablefish. Significant quota reductions have occurred in the NSEI sablefish fishery and the lingcod fishery, the latter based largely on declining catch per unit effort in the commercial fishery.

Many groundfish species exhibit life history characteristics such as longevity, slow growth, and low natural mortality that make them susceptible to over-harvest. Stock assessment is difficult given that many of these species (i.e. sablefish, lingcod, and pacific cod) move between management areas or live in habitats difficult to assess using traditional techniques (i.e. rockfishes). Much of our research effort for sablefish, lingcod, and black rockfish has been focused on mark-recapture studies to determine exploitation rates and abundance.

Miscellaneous Shellfish

Southeast Alaska commercial miscellaneous shellfish fisheries are managed according to management plans set in regulation and approved by the Board of Fisheries. These management plans have in common a number of provisions designed to provide for sustainable fisheries of a group of species for which there is relatively little knowledge about stock productivity, response to harvest and general life history.

Prior to July 1, 1996, entry into Southeast Alaska's dive fisheries was open access, requiring a permit be issued by the CFEC for participation. Historically, most fisheries started off slowly with little effort but interest grew relatively quickly as exvessel value increased, new markets opened, and fishers explored for new ways to expand beyond the more traditional fisheries such as salmon or groundfish. Effort quickly soared to levels that made it difficult for the department to manage each fishery, and individual fisher's proceeds quickly diminished.

Sea Cucumbers

The sea cucumber fishery is managed according to the Southeast Alaska Sea Cucumber Commercial Fisheries Management Plan (5 AAC 38.140). The plan provides for an October 1 opening date with weekly fishing periods of seven daylight hours on Mondays, plus an additional four daylight hours on Tuesdays through March. There are also provisions for limiting the numbers of divers per vessel to two, providing fishing period trip limits of 2,000 pounds per person, and limiting gear to scuba, surface-supplied systems, or snorkels. The department must conduct a biomass assessment within the preceding two years of opening an area for commercial harvest. Annual commercial fishery guideline harvest levels are approximately 5% of the total sea cucumber biomass taken on a three-year rotational basis (i.e. 15% on a three-year basis). Rotational fisheries have the advantage of lowering overall departmental assessment survey and management costs.

Sea Urchins

In 1996, the department, in cooperation with the sea urchin fishing industry, developed interim regulations and a management plan for a commercial fishery in Southeast Alaska beginning with the 1996/97 season. The regulations were adopted by the Commissioner of the Alaska Department of Fish and Game, under the authority of 5 AAC 39.210 for High Impact Emerging Fisheries and became effective in December, 1996. The Alaska Board of Fisheries formally

adopted the red sea urchin management plan during their regular meeting in January 1997. The core elements were:

Annual guideline harvest levels are 6% of the biomass estimate, which is the lower bound of the 90% confidence interval for biomass. Through the 2005–2006 season, fisheries were only opened where biomass surveys had been conducted in the previous three years. In February 2006, the BOF approved regulations to allow commercial fisheries to take place in areas where surveys have been conducted within the previous six years. This provision was established for areas where commercial exploitation was very low or nonexistent in an attempt to make surveys more financially feasible.

Harvest opportunities are to be distributed to each week of every month that the fishery is open. The fishery is to be managed to span approximately four months, subject to needs for conservation, law enforcement, reducing waste, and promoting fishery development. Size limits and trip limits may be imposed if needed to slow the pace of the fishery.

Processing vessels must carry observers, and vessels transporting unprocessed product out of Registration Area A must first contact the department.

In addition to fish ticket requirements, processors must submit records of the roe recovery within 30 days of landing.

Geoducks

The objective of geoduck fishery management is to allow only a very low exploitation rate because the species is long-lived and recruitment is sporadic and low. A management plan was adopted by the Board of Fisheries in January 2000, which specifies a fishing season of October 1 through September 30. The department generally decides the starting date of the fishery after consultation with SARDFA. To avoid the summer spawning and recovery period and to minimize PSP toxin levels, harvest usually occurs in late fall through early spring. Other key elements of the management plan are a mandatory stock assessment survey within 12 years preceding a fishery opening, biomass thresholds of 30% of original biomass and limitations to use of dive gear only while using manually-operated water jet devices.

In response to industry requests to increase likelihood of shipment of live product, and thus value of the fishery, the Board of Fisheries adopted regulations allowing the department to manage the geoduck fishery based on pre-season and in-season results of PSP tests conducted by the DEC. SARDFA, ADEC and the department have worked together to develop sampling protocols for PSP testing that will allow certification of geoduck harvest areas prior to harvest. Consequently, the department now manages the fishery by delaying opening dates of individual areas until certified by ADEC for PSP. If areas do not pass testing, they will be opened for harvest of product bound for processed markets. The 2010–2011 season will be the ninth in which the fishery will be managed based on results of PSP testing.

Shellfish

The information available to manage regional shellfish fisheries lags far behind the information that is needed. Shellfish abundance is difficult to estimate. They do not swim home to natal streams where they can be counted, as salmon do, and they have a diversity of complex life histories that makes stock assessment challenging. However, shellfish are not impossible to count, and in fact, our department has pioneered the use of various stock assessment tools to

estimate crab populations, as for example, has been done with several important stocks in the Bering Sea. The value in doing so is to be able to set harvest levels based on abundance, which is the hallmark of successful fisheries management, including our state's salmon management program. To this end, we have adopted the catch-survey analysis used for several Bering Sea crab stocks to estimate the abundance of red king crab in Southeast Alaska. This information has been used successfully for nearly a decade to set conservative harvest levels based on abundance. For the past two years, the same model has been used to estimate the abundance of Tanner crab in Southeast Alaska.

The shellfish program in the Southeast Region has made substantial progress towards developing improved stock assessment for species other than red king and Tanner crab; however, much of what has been done to date in improving stock assessment has been on a trial or pilot study basis. There are significant shortfalls in funding to fully evaluate the risk and sustainability of current harvest levels for the region's shellfish fisheries. The stock assessment projects described below are designed as a concerted move towards abundance-based management similar to the regional programs for red king and Tanner crab.

Management of the shellfish fisheries in the Southeast Region is in transition. Historically, harvest guidelines were set for each region (Southeast and Yakutat) as a whole without regard to fishing patterns and local stock concentrations. For this reason, management has been the responsibility of the regional shellfish management biologist and there has been a reluctance to move towards more localized management without sufficient staffing, operational funds, or appropriate management controls. Intensification of regional shellfish fisheries has generally led away from single guideline harvest levels for the region as a whole. However, ideas of the best management approach (regional versus smaller scale) for shellfish fisheries in Southeast Alaska have fluctuated as additional data, information and experience is gained from these fisheries.

Increasing effort in the Southeast Alaska pot shrimp fishery in the mid-1990s led the department to establish district level guideline harvest levels and to transfer management authority to individual area offices, principally Ketchikan, Petersburg, Sitka, Juneau and Haines. Staff in those offices can more fully focus on tracking local catches to stay within the guidelines, and they are also more attuned to local area concerns, such as localized depletion and missing year classes. Transferring management authority to area offices is not the solution for all shellfish fisheries; indeed, the area office staffs would have to be enlarged significantly for that to be possible. Instead, gradual changes are being put into place to accomplish localized management where feasible.

The red king crab fishery has a mixture of local and regional management. The guideline harvest level is set for the region, but the survey-based stock assessment program allows the department to identify local areas, usually bays, having low abundance or weak stock segments. As needed, these areas may be closed for one or more seasons, or they may be opened for a shorter period than the region as a whole to allow local populations to rebuild. Similar harvest controls are possible on a district level basis using stock abundance estimates from the assessment surveys, and these may be used in the future depending on the availability of staff resources to achieve more finely scaled management. Also, to meet commercial fishery allocation guidelines set by the Board of Fisheries, the department sets maximum harvest levels in Section 11-A near Juneau.

The golden king crab fishery currently has seven management areas in regulation. This is two more than in prior years as a result of Board of Fisheries action, which divided two of the five

traditional areas. This was done to allow harvests to more accurately reflect varying stock status among areas. The drawback of more finely dividing the management activity has been an increasing burden to track local catches by department staff. Despite this burden, the department recognizes that more localized management in may help ensure long-term sustained yield.

The Southeast Tanner crab and Dungeness crab fisheries are two of the most valuable regional shellfish fisheries. They are both managed on a regional basis. Of these two species, there is a stock assessment survey in place only for Tanner crab. As this stock assessment program matures, there may be increased options to manage Tanner crab on a regional scale or smaller scale to minimize the risk of local depletions threat to long-term sustained yield. Although there have been limited stock assessment efforts for Dungeness crab, there remains a need, especially in light of the Yakutat Dungeness crab population collapse. It will be important for these fisheries to have adequate staffing in the regional and area offices to meet the increasing needs and opportunities for localized management.

FISHERY PARTICIPATION

Salmon

The number of renewed salmon permits in 2010 by gear type was 379 purse seine, 474 drift gillnet, 167 set gillnet, 1,046 hand troll, and 962 power troll.

Herring

A total of 49 sac roe seine, 111 sac roe gillnet, 6 winter food/bait, 109 Northern and 174 Southern spawn-on-kelp, and 4 bait pound permits were renewed in 2010.

Ground Fish

For sable fish a total of 93 and 23 permits were renewed in 2010 for the Chatham Strait and Clarence Strait fisheries respectively. For Demersal shelf rockfish longline and directed lingcod a total of 80 and 139 permits respectively were renewed in 2010.

Miscellaneous Shellfish

In 1996 the Alaska State Legislature established a four-year moratorium on interim-use permits for the Southeast dive fisheries. The legislation, HB 547, was incorporated into statute as AS 16.43.228. The moratorium specified a cap on the total number of interim-use permits in the Southeast Alaska abalone, geoduck, sea cucumber, and sea urchin fisheries. The legislation temporarily halted growth in the number of participants in these fisheries and provides specific eligibility criteria to be used in each fishery. In July 2000, CFEC adopted regulations to limit entry in the sea cucumber, sea urchin and geoduck fisheries. A total of 291 sea cucumber, 71 urchin, and 91 geoduck were renewed in 2010.

Shellfish

There are several different combinations of golden king crab, red/blue king crab, and Tanner crab permits in Southeast Alaska. There were 24 Tanner ring permits, 25 Tanner pot permits, 8 golden king crab pot permits, 6 red/blue king crab pot permits, 7 all king crab pot permits, 16 red/blue/Tanner pot permits, 5 golden/Tanner pot permits, and 32 all king and Tanner crab pot permits renewed in 2010. There are four different tiers of Dungeness crab permits issued for

Southeast Alaska. There were a total of 49 300-pot permits, 43 225-pot permits, 85 150-pot permits, and 113 75-pot permits renewed for this species in 2010. For shrimp there were 26 beam trawl and 275 pot permits renewed in 2010.

EXVESSEL VALUE

Salmon

The exvessel value (wholesale fish ticket value) of the 2010 Region I commercial salmon harvest was estimated at $102 million, well above the recent 10-year average of $95 million. This exvessel estimate is probably below the actual value because it is based on the price reported on fish tickets and does not include subsequent price adjustments. The actual exvessel value, possibly 10 to 20% higher, will not be known until final processor reports are received and analyzed by the Commercial Fisheries Entry Commission (CFEC).

The exvessel value in salmon fisheries by gear was highest for purse seine ($44.9 million), followed by troll ($29.6 million), drift gillnet ($25.1 million), and set gillnet gear ($2.2 million).

Herring

The exvessel value (wholesale fish ticket value) of the 2010 Region I commercial herring harvest was estimated at $16.7 million, well above the recent 10-year average of $9.9 million.

The exvessel value in herring fisheries by fishery was highest for sac roe purse seine ($12.7 million), followed by Northern spawn-on-kelp ($2.6 million), Southern spawn-on-kelp ($867 thousand), and sac roe gillnet ($523 thousand).

Ground Fish

The Chatham Strait and Clarence Strait sable fish fisheries are by far the most valuable State managed commercial ground fish fisheries in Region I. The approximate ex-vessel value in 2010 was $3.8 million and $1.6 million respectively. While of lesser value the open access directed fisheries for Demersal shelf rockfish and lingcod were also important economically with ex-vessel values of $114 thousand and $235 thousand respectively.

Miscellaneous Shellfish

Prior to 2006, annual ex-vessel value of this fishery was approximately $1 million. The value of these fisheries has increased substantially in recent years. The approximate ex-vessel value of the miscellaneous shellfish fisheries was $9.2 million in 2010 which is well above the recent 10-year average of $5.3 million. Much of this increase is due to the industry's ability to market live geoduck clams. This has been accomplished through increased PSP testing on an inseason basis.

Shellfish

From a statewide perspective, the shrimp fisheries in Southeast Alaska are the last significant fisheries of their kind, and the Dungeness crab fishery is the largest in the state. The total ex-vessel value of Southeast Alaska shellfish fisheries was approximately $11.7 million in 2010. About half of this value can be attributed to the Dungeness crab fishery ($5.6 million), followed by the king/Tanner crab fisheries at $4.5 million, and the shrimp fisheries at $1.6 million.

PROPOSED PROJECTS

This document contains a list of projects proposed for increased funding (Table 1). The projects described are either not conducted due to a lack of funding or are currently operated at levels insufficient to meet management objectives due to erosion of funding levels.

Salmon

Thousands of salmon runs contribute to salmon harvests in Southeast Alaska. Commercial salmon harvests are sampled for a wide variety of biological data that is necessary for effective resource management and research activities in the region. Catches are sampled for age, sex, and size information, for a variety of data used for stock composition studies (scales, otoliths, presence of coded wire tags, presence of parasites, and genetics samples), for troll fishery performance data, for pink salmon sex ratio data used to determine run timing, and for a variety of other information. Select salmon escapements are sampled for age, sex, and size information and other biological characteristics. Thorough understanding of stock compositions of harvests is necessary to allow accurate run reconstruction, develop better understanding of stock-specific productivity, establish and improve escapement goals, monitor international harvest sharing agreements, and assess effects of management actions.

A significant amount of funding for catch and escapement sampling programs in Southeast Alaska comes from federal sources. Funding levels have largely remained static, while costs have risen and increased demands have been placed on the program.

The department administers many projects related to Southeast Alaska salmon fisheries under the auspices of the Pacific Salmon Treaty. The State receives federal funding for many of those projects and relies heavily on that funding to conduct salmon stock assessment and management in the region. Several projects related to the Treaty have been funded from allocations from the Alaska Sustainable Salmon Fund and Northern Fund in recent years.

Herring

The Division of Commercial Fisheries received a General Fund increment of $145,000 in FY11. A portion of that increment was allocated to area office herring management projects which significantly reduced the reliance on test fish revenue. The balance of that increment was allocated to fundamental research projects deemed a high priority. While this increment allowed for significant improvements in the Southeast Alaska herring program fundamental questions remain which, if answered, could provide for significant improvements to stock assessment methods.

Ground Fish

The projects described are either not conducted due to a lack of funding or are currently operated at levels insufficient to meet management objectives. Much of the ongoing research and management of groundfish are funded through federal grants or revenue generated through test fisheries. The first significant General Fund support was provided during fiscal year 2010. It is difficult to accomplish many project research goals under the short time period (1–3 years) associated with most grants. Currently most of the groundfish staff is funded either under the federal AKFIN, Interjurisdictional (IJ) or Demersal Shelf Rockfish (DSR) Stock Assessment grants. Stable funding in the face of increasing costs, particularly salary increases, has led to inflationary loses in these grants. The department relies heavily on these Federal grants and

assumes they are stable, long-term funding sources. However if the AKFIN, IJ, or DSR budgets were not funded the department would require about $640.0 in addition to what is requested here.

At the 2000 Western Groundfish Conference held in Sitka, there was a special session on sablefish management and assessment. A panel of experts (scientists, fishermen, and managers) was convened to identify areas needing further research. Their recommendations were to look at three areas:

1) What is sablefish abundance by region?
2) What data is needed to estimate abundance?
3) How does movement between regions affect abundance estimates?
4) What is a sustainable harvest rate?

The sable fish projects listed below address those questions.

In general, the addition of moderate to large scale stock assessment projects requires additional groundfish staff, as current staff is completely committed to existing projects. Staffing needs are explicitly stated below only for a lingcod stock assessment project due to the large scale and high priority of that proposed project. However, the addition of other long-term projects should only be considered if funding for additional staff is provided. The number and level of staff should be determined on a case-by-case basis, but generally, a Fishery Biologist II should be assigned no more than two projects and biometric assistance is required for new projects.

Miscellaneous Shellfish

General Fund support for dive fisheries management and stock assessment in Southeast Alaska has remained stable while the fisheries have expanded substantially in recent years. It has been the policy of ADF&G Southeast Region to not conduct new fisheries without prior identification of funding sources. This policy was established to prevent re-allocating staff time from already developed fisheries. The creation of SARDFA mitigated budgetary needs, however assessments generated are fishery-specific and shortfalls occur annually. This is especially true for sea urchin and geoduck fisheries, where either the value of product is low due to current market conditions, or costly PSP sampling uses most of the revenue generated from the self-imposed assessment tax. Federal funding in the form of Nearshore Marine Research grants was relied upon for several years to maintain basic functions of conducting biomass surveys and funding staff time. This funding source has not been available for several years and cannot be relied upon as a long-term solution to growing needs of additional staff and development of research projects needed to answer basic questions about population levels and life history to manage these fisheries adequately.

An additional future funding need that is anticipated but not requested below is for regular red sea urchin surveys. Regulations require that prior to opening a commercial fishery, a stock assessment survey be conducted within the previous six years. There is currently no dedicated funding for conducting red urchin surveys. This has not been a limiting factor in harvest potential up to this point in time because a majority of the harvestable surplus has not been taken in recent years.

Shellfish

Additional staffing is the greatest need of the Shellfish Project. In 2006 the region implemented a major split within the Shellfish Project that resulted in separate Research and Management sections. This was done in response to a need for more focused attention on crab management issues and stock assessment development and reporting. There exist a minimal number of positions to effectively maintain this split and additional staff will allow much smoother and independent operation of these two units. The Shellfish Project has taken on some major surveys over the past several years, with only a modest increase in staffing. Newly implemented projects include a Tanner crab stock assessment survey and a pot shrimp stock assessment survey. Although vital information on stock status is being collected, through stock assessment surveys, their development has reduced the time available for staff to regularly communicate with commercial fleets, creating a growing gap of understanding between fishers and the department. Furthermore, the insufficient staffing levels are preventing full and timely incorporation of this information into management and dissemination to the public.

Personal use harvest documentation is important for estimating total fishing mortality as personal use harvests increase in significance relative to commercial harvests. Obtaining estimates of personal use red king crab harvest was a high priority recommendation from an independent review panel convened in 2005. There are currently no viable estimates of personal use or subsistence harvests of shellfish in Southeast Alaska other than for red king crab in Section 11-A (Juneau area).

Another major need for the Southeast Alaska shellfish program is improvements to existing stock assessment projects. This improvement includes a benthic habitat mapping project. This project is intended to help delineate habitat for use in restratification of the department's Tanner crab, red king crab, or shrimp stock assessment surveys. Previous results from restratification have shown that survey effort becomes more proportional to variability in catch rates and ultimately produces more precise estimates of abundance.

Other priorities include developing and implementing independent verification of the department's abundance estimates for Tanner crab. This project would be similar to the project currently being conducted for red king crab using funding from the North Pacific Research Board and one-time General Fund increments in FY11 and FY12. The department conducts similar stock assessments for these species. Although the methods used are considered scientifically sound, industry representatives have difficulty believing the results are accurate. Independent methods have been developed for red king crab to ground truth estimates derived from the catch-survey model.

Development of a stock assessment and soft shell monitoring program for Southeast Alaska Dungeness crab stocks is another information gap. The Southeast Dungeness crab fishery is very intense in nature and there is a high degree of uncertainty regarding stock status and the viability of the relatively passive management system that has been used historically. While Southeast Alaska commercial harvests of Dungeness crab have been fairly stable for some time the trend since the 2007–2008 season has been for reduced harvests (5.4 million pounds in that year and 3.2 million pounds in the most recent season). The reasons for this decline are not well understood.

Yakutat area Tanner and Dungeness fisheries have been closed for several years and will remain closed until better stock status information is obtained. The department received a $30,000

increment to conduct a small scale survey for Dungeness crab in FY12. The intent is to conduct alternating bi-annual surveys for Dungeness and Tanner crab in the Yakutat area. These projects would be limited in nature and would be fielded to determine if stock recovery has taken place. If indications of stock recovery are documented with small-scale surveys, then more detailed stock assessment monitoring projects could be developed.

Table 1.–Summary of proposed projects and estimated costs (thousands of dollars). Projects denoted by * would require additional staffing to be completed.

Project	Estimated First-Year Cost (Thousands)	Estimated Annual Continuing (Thousands)	Duration Cost
Salmon			
Salmon aerial surveys	$150.0	$150.0	Long Term
Alaska sockeye and Chinook stock assessment	$550.0	$550.0	Long Term
Auke Creek Salmon Assessment	$49.5	$49.5	Long Term
Prince of Wales Chum Salmon Assessment	$20.0	$20.0	3 Years
Ketchikan Summer Chum Helicopter Surveys	$36.0	$36.0	3 Years
Assistant Troll Biologist	$85.0	$85.0	Long Term
Herring			
Herring Research Fishery Biologist II	$85.0	$85.0	Long Term
Movement, Migration, Stock Identification*	$90.0	$90.0	5 Years
Survey Methods Improvement for Macrocystis Kelp*	$20.0	$20.0	3 Years
Juvenile Index Survey Pilot*	$75.0	$75.0	2 Years
Ground Fish			
Demersal Shelf Rockfish Stock Assessment	$260.0	$260.0	5 Years
Lingcod Stock Assessment	$250.0	$250.0	Long Term
Age Laboratory Support	$48.0	$48.0	Long Term
Black Rockfish Stock Assessment	$70.0	$70.0	3 Years
Assessment of Pacific Cod, Dogfish, and Other Groundfish Species in the Internal Waters of Southeast	$120.0	$145.0	Biennial, Long Term
Fecundity Study (GSI) of Key Groundfish Species	$50.0	$40.0	3 Years
Miscellaneous Shellfish			
Miscellaneous Shellfish Biometrician I	$90.0	$90.0	Long Term
Geoduck Aging	$50.0	$50.0	2 Years
Geoduck Recruitment and Control Studies	$50.0	$50.0	Long Term
Abalone Stock Assessment	$15.0	$15.0	2 Years
Shellfish			
Southeast Alaska Shellfish Management Fishery Biologist II*	$85.0	$85.0	Long Term
Southeast Alaska Shellfish Research Biologist II or additional biometrics staff**	$90.0	$90.0	Long Term
Southeast Region Shellfish Personal Use Harvest Documentation and Management Program*	$75.0	$15.0	Long Term
Dungeness Crab Stock Assessment and Soft Shell** Monitoring	$75.0	475.0	Three Years
Tanner Crab Population Independent Verification Southeast Area	$75.0	--	Two Years

PROJECT DESCRIPTIONS

SALMON

Salmon Aerial Surveys

Location: Entire Southeast Alaska/Yakutat Area

Primary Objective: To provide increased state general fund support for the salmon aerial survey program.

Description: Intensive monitoring of incoming run strength is required for successful abundance-based management of commercial salmon fisheries in Southeast Alaska and Yakutat. Aerial surveys are the primary assessment method used to monitor pink and chum salmon throughout the region and sockeye and coho salmon runs in the Yakutat Management Area. Fishery openings are targeted where production surplus to escapement goals is identified. Survey costs have increased rapidly in response to increased fuel and insurance costs; however, annual general fund operational budgets have not increased accordingly. As a result, the number of streams monitored and frequency of aerial surveys has decreased, particularly after fisheries end in the fall season. This has degraded the department's ability to monitor peak escapement counts which, in turn, affects our ability to measure the effect of harvest, establish escapement goals, and allow fishing opportunity. Additionally, numerous changes in management staff that conduct aerial surveys have occurred in the last several years. To be effective, the new staff requires training surveys to learn the art of aerial observation. The existing state general fund support for salmon aerial escapement surveys is approximately $200,000 annually. This funding is distributed to the Sitka, Ketchikan, Petersburg, Haines, and Yakutat area offices. The Alaska Sustainable Salmon Fund (AKSSF) provided additional funding for aerial surveys through the 2012 season. Long term funding has not been secured, however, and maintaining adequate aerial survey monitoring of wild salmon stocks is essential for the continued sustainable management of commercial fisheries in Southeast Alaska.

Duration: A long-term stable funding source is desired. The project currently has short-term AKSSF funding.

Estimated Annual Cost: $150.0

Southeast Alaska sockeye and Chinook salmon stock assessment

Location: Entire Southeast Alaska/Yakutat Area

Primary Objective: To provide increased state general fund support for the sockeye and Chinook salmon stock identification program.

Description: This increment seeks State General Fund support for two specific projects. The first is the Southeast Alaska sockeye salmon stock identification project. Department port sampling staff sample commercial landings of sockeye salmon from the District 1, 6, 8, and 11 drift gillnet fisheries and the District 4 purse seine fishery. The samples collected are analyzed to determine stock composition of commercial landings. This allows the State to document that sockeye salmon harvest sharing arrangements required by the Pacific Salmon Treaty are being met. In the absence of this data fishery managers would be more conservative and limit fishing opportunity to reduce the probability of incurring overages of sockeye salmon stocks subject to harvest sharing provisions of the Treaty. The cost of this project is $440,000. The second provides salary support for an existing salmon Biometrician II who is tasked with work related to Treaty obligations for Chinook salmon. The position reports directly to the Fisheries Scientist II who serves as the Alaska co-chair of the Chinook Technical Committee. The position is tasked with a wide variety of duties associated with implementation of Chinook salmon portions of the PST. Those duties include calculating terminal exclusions for salmon harvested in several

important fisheries in the region including the troll fishery and the District 8 and 11 directed Chinook salmon fisheries. Documenting terminal exclusions in Southeast Alaska Chinook salmon fisheries provides for additional fishing opportunity on Chinook salmon that are not subject to the all-gear Treaty allocation that is determined by the Chinook Technical Committee on an annual basis. The cost of this part of the request is $110,000.

The projects included in this request are currently funded by the Alaska Sustainable Salmon Fund (AKSSF). This funding source will no longer be available beginning in FY2014 due to changed authorizing uses by Congress. This increment would provide stable, long-term funding for these essential projects.

Duration: A long-term stable funding source is desired. The project currently has short-term AKSSF funding.
Estimated Annual Cost: $550.0

Auke Creek Salmon Assessment

Location: Auke Creek, Southeast Alaska.
Primary Objective: To estimate spawning escapement, smolt production, marine survival, adult return, exploitation rate by fishery and age composition for the coho salmon population in Auke Creek. Also, to monitor pink and sockeye salmon fry and smolt emigration and adult escapement.
Description: Auke Creek in Juneau has the longest-studied coho salmon population in Southeast Alaska (since 1979) and is one of five key long-term indicator stocks for management of fisheries for the species in the region. Information provided by Auke Creek coho salmon studies forms an essential part of the annual inseason management of commercial troll fisheries in northern Southeast Alaska. A specially-designed weir facility on the creek provides 100% enumeration of salmon migrants to and from the system. Coho and sockeye salmon smolts and adults are sampled for age-length-sex and all coho salmon smolts are coded-wire tagged. In addition to its key role in long-term studies of coho, pink and sockeye salmon, the accessibility of the Auke Creek facility to federal, state and university research staff has provided a platform for many shorter duration research projects that have contributed greatly to knowledge of salmon in Alaska. This project would provide support for a weir technician and necessary supplies from March−December to help operate and maintain Auke Creek Weir for continuous monitoring of downstream and upstream migrations of all salmonids and to age scales. All coho salmon smolts migrating from this system will be coded wire tagged and sampled for length distribution and freshwater age determination. Sockeye salmon smolts will be counted and sampled for length distribution and freshwater age determination while returning sockeye adults will be sampled for marine age determination. Pink salmon fry and returning adults will be counted daily as they migrate through Auke Creek Weir. The technician funded by this project will also provide support for federal, state and university funded research projects. The PCSRF provided short-term funding through spring 2011; however, long term funding has not been secured. The continuation of long term studies at Auke Creek are essential to improve understanding of the processes that affect salmon production in the region and are essential for the continued sustainable management of coho salmon and the commercial troll fisheries in northern Southeast Alaska.

Duration: A long-term stable funding source is desired. The project currently has short-term PCSRF funding.
Estimated Annual Cost: $49.5

Prince of Wales Chum Salmon Assessment

Location: Prince of Wales Island.

Primary Objective: Improve chum salmon stock assessment on Prince of Wales Island.

Description: Chum salmon spawning abundance in Southeast Alaska is currently monitored though a series of peak survey counts at 88 index streams upon which ADF&G escapement goals for summer and fall chum salmon are based. Although chum salmon, particularly fall-run fish, are widespread and numerous on Prince of Wales Island, only one summer-run index stream and two fall-run index streams on the entire island are currently included in escapement indices due to a lack of sufficient historical assessment information. The purpose of this project will be to identify streams on Prince of Wales Island to include in summer and fall chum salmon escapement indices. A set of potential streams will be developed through consultation with area management staff and review of historical survey data. Streams will then be surveyed to determine suitability for long-term monitoring. Increasing the number of chum salmon index streams on Prince of Wales Island will result in more consistent monitoring of chum salmon over a wider geographic area and improve management of this important resource.

Duration: Three years.

Estimated Annual Cost: $20.0

Ketchikan Summer Chum Helicopter Surveys

Location: Mainland chum salmon index streams in Boca de Quadra and East Behm Canal near Ketchikan.

Primary Objective: Improve chum salmon stock assessment in mainland rivers in the Ketchikan management area.

Description: Summer-run chum salmon spawning abundance is currently monitored in 81 index streams in Southeast Alaska, primarily through aerial surveys. Escapement goals for summer chum salmon in the region are based on peak survey counts to aggregates of these streams in three broad subregions: Northern Southeast Inside (63 index streams), Northern Southeast Outside (5 index streams), and Southern Southeast (13 index streams). Summer chum salmon abundance was well below average from 2008 to 2010 and escapement goals for the Northern Southeast Inside and Southern Southeast subregions were not met.

ADF&G managers have recently expressed concern regarding their ability to obtain reliable counts of chum salmon in some streams due to the difficulty in separating chum salmon from pink salmon during fixed-wing aircraft surveys. This has been particularly true of some of the large mainland rivers near Ketchikan where chum salmon may be masked by high densities of pink salmon, particularly in years of high pink salmon abundance or low chum salmon abundance. This project will fund helicopter surveys of the major Ketchikan area index streams where chum salmon are potentially difficult to identify from fixed-wing aircraft and where the size of the systems prohibits surveying on foot. Helicopter surveys will allow managers to obtain much better views of these streams, validate observations through comparison of helicopter and fixed-wing aircraft surveys over various escapement sizes of both pink and chum salmon, and improve managers' ability to identify chum salmon during regular aerial surveys of other index streams in the area. This work will improve chum salmon stock assessment in Southeast Alaska and is essential to ensure that perceived low abundance of summer chum salmon is not simply an artifact of difficult survey conditions.

Duration: Three years.
Estimated Annual Cost: $36.0 annually.

Assistant Troll Fishery Management Biologist

Location: Juneau, Alaska.
Primary Objective: Provide additional management support for the Southeast Alaska salmon troll fishery.
Description: Historically, one Regional Troll Biologist and two assistant biologists have managed this complex fishery. One of the assistant positions was cut because funding from the Federal Pacific Salmon Treaty grant has been insufficient to cover the costs of inflation. The loss of this position limits the department's ability to make inseason management decisions, particularly in the spring troll season, reduces the opportunity for public interaction, and reduces staff support for industry contacts. In addition to direct fishery management responsibilities and placement of department staff in multiple ADF&G offices for direct service to the public, funding of this position would allow the troll fishery management team to reorganize participation in post-season committee work associated with the Pacific Salmon Treaty.

Duration: Long term.
Estimated Annual Cost: $85.0

HERRING

Herring Research Fishery Biologist II

Location: Southeast Alaska.
Primary Objective: To improve the region's herring stock assessment program through stable research staff support.
Description: Through 2005 the region had two Fishery Biologist IIs and one Fish and Wildlife Technician to assist with coordination and implementation of herring stock assessment projects in Southeast Alaska. One of the Fishery Biologist II positions was deleted when the incumbent accepted another position within the region. The funds associated with the position were reprogrammed to provide stable funding for the remaining two positions. Those two remaining positions had been funded by a wide variety of short term projects which have since lapsed or been significantly reduced.
Although regular stock assessment survey and sampling needs are being met with current staff, if new projects are added (signified with asterisk in Table 1), a new Fishery Biologist II position will be necessary to assist with, and/or implement field work, data management, and report writing.

Duration: A long-term stable funding source is desired.
Estimated Annual Cost: $85.0

Movement, Migration, and Stock Identification Pilot Study

Location: Southeast Alaska Area.
Primary Objective: To improve understanding of herring stock structure.
Description: Of primary consideration when assessing and managing herring stocks is an understanding of population structure and having some knowledge about whether there exists spawning site fidelity and stock discreteness. Debate about how to define herring stocks

continues at many levels from scientific researchers to local resource users. In Southeast Alaska, herring are assessed based on areas where spawning is recurrent annually and is spatially or temporally separated from other spawning areas. To improve or verify delineation of herring stocks in Southeast Alaska, an understanding of movement or migration patterns would be highly valuable. Herring in Southeast Alaska, and elsewhere, may be distributed broadly across areas, and exhibit seasonal movement/migration, and even mix with other stocks during summer feeding or over-wintering months. In addition, age, size, or maturity classes may have different distributions over the course of a year. The extent of movement, mixing, and "straying" to other spawning areas is unknown in Southeast Alaska. In some areas, the rate of exchange between areas is suspected to be at high levels. In the Ketchikan area, herring abundance around Kah-Shakes, Cat Island, Annette Island, and West Behm Canal, has fluctuated so much that movement between areas is highly suspected. Other areas where significant exchange may occur are Hobart Bay-Port Houghton and Seymour Canal. Additionally, there have been questions raised about whether herring in Salisbury Sound are discreet from herring in the Sitka Sound spawning area.

The most direct way to estimate the extent of movement is to conduct tagging studies. Very limited tagging studies have been conducted in Southeast Alaska in the past, during the 1930s herring reduction fisheries. These studies used internal tags and focused on movement between Sitka Sound and Craig. British Columbia has had a successful tagging program in more recent years using external tags. Other non-tagging studies are have been conducted or are on-going to attempt stock differentiation using genetics, fatty acid composition, or analysis relating otolith chemistry to water chemistry in the vicinity of spawning grounds.

A full-scale tagging program would require significant funding and time, as it should involve several areas/stocks and several years of release and recovery. A smaller pilot project involving two spawning areas should be done to evaluate feasibility of tagging and recovery methods. Such a project would require a large vessel platform, potential contracting with commercial purse seine vessels, and use of herring pound structures. It is expected that herring would be captured during spawning season, stored in submerged pound structures while tagging, and then recaptured during subsequent commercial fisheries at processing plants.

Duration: Five years.
Estimated Annual Cost: $90.0

Survey Methods Improvement for Macrocystis Kelp

Location: Sitka Sound in Southeast Alaska Area.
Primary Objective: Develop spawn deposition survey method specific for Macrocystis kelp.
Description: Spawn deposition surveys are conducted throughout Southeast Alaska annually to provide a basis for estimating and forecasting herring biomass. The method involves following transects across the width of egg deposition and estimating the number of eggs within a sampling frame every five meters. The habitat encountered along transects is variable and kelp forms may range from carpet-like algae to towering Macrocystis kelp that form a canopy "forest". The survey method works well for low-lying kelp forms that are within 2–3 feet of the bottom. However, because individual Macrocystis stipes may be 20–40 feet tall and often extend from the bottom to the surface, it is a challenge to obtain a reasonably precise estimate of the number of eggs within the sampling frame, which is set on the bottom. Herring egg estimates are commonly found on Macrocystis kelp and at times in great numbers. During years when

significant herring eggs are spawned on Macrocystis kelp, estimates of total egg deposition for an area may be highly variable. This is because egg estimates of one Macrocystis plan may be highly variable, and one, or very few, transects that cross Macrocystis kelp beds could result in very high egg estimates relative to other transects, resulting in high uncertainty around total estimate egg deposition. A method for use specifically when Macrocystis beds are encountered may result in lower variability of total estimates. Macrocystis kelp is found mainly in spawning grounds around Sitka Sound and Craig. A method would be developed in one of these two areas and then, pending results, applied within annual spawn deposition surveys.

Duration: Three years.
Estimated Annual Cost: $20.0

Juvenile Survey Index Pilot

Location: Sitka Sound in Southeast Alaska Area.
Primary Objective: To ultimately predict strength of recruitment to spawning populations.
Description: In Southeast Alaska, the department's herring stock assessment program focuses on sampling during egg and mature (typically age-3+) herring stages. There is a poor understanding of herring ecology, abundance, and distribution during larval through age-2 or age-3. The department's stock assessment methods estimate age-3 herring after they join the mature population, but not before entering the mature population. Currently, forecasts of age-3 herring have been based on assuming the median number of estimated age-3 herring from past years, or more recently for age-structured modeled areas, based on a spawner-recruitment relationship. These methods have been used because there is no sampling on which to base estimates. A method to forecast recruitment to the mature population may be beneficial by potentially allowing more accurate forecasting of overall return, and if so, more appropriate harvest levels.
Surveys designed to index and forecast strength of recruitment (age-3 herring) have been conducted in British Columbia with some success, at least since 1991. These surveys are comprised of conducting several transects within bays using purse seine, and data are used to determine the relative amount of herring in their first and second year. Those young herring are then compared to estimates of herring of the same cohort 1–3 years later to develop a statistical relationship. A survey of similar design could be explored and potentially initiated in the Sitka Sound area to better forecast recruitment.

Duration: Ten years.
Estimated Annual Cost: $75.0

GROUND FISH

Demersal Shelf Rockfish Surveys

Location: Southeast Alaska
Primary Objective:
Description: The goal of this project is to provide state general fund support for the demersal shelf rockfish (DSF) stock assessment program.
The state has been delegated management authority of DSR with North Pacific Fishery Management Council (NPFMC) oversight via the *Gulf of Alaska Fishery Management Plan* (FMP). Annual stock assessment reports are prepared by ADF&G and reviewed by the Gulf of Alaska Plan Team. Groundfish fisheries under the FMP are managed under a tier system. Which tier a given species assemblage is assigned is dependent on the data available; better data leads to

less conservative harvest controls. Currently, because there are reliable point estimates of *B, F35%*, and *F40%* for yelloweye rockfish, the species complex is managed under Tier 4. This survey is essential for assessment of this long-lived, vulnerable, and valuable species. There has been a lapse in surveys for many Southeast Alaska subareas and the Gulf of Alaska Plan Team is requiring additional surveys be conducted. This funding would be used in conjunction with existing federal funding received from the Extended Jurisdiction grant to conduct surveys on an accelerated schedule to bring DSR stock assessments up to date.

In the absence of adequate data for DSR, it is likely that the species assemblage will be assigned a lower tier and will thus have to be managed on a more conservative basis. This would have negative implications for both commercial and sport fisheries because the Alaska Board of Fisheries has adopted an allocation plan for DSR. The greatest benefit of this work would accrue to the halibut longline fishery as it takes most of the DSF allowable biological catch as bycatch. The charter halibut fishery is already under severe halibut harvest allocation constraints; if DSR had to be managed more conservatively, the charter industry could be seriously impacted.
Duration: Five years.
Estimated Annual Cost: $260.0

Lingcod Stock Assessment

Location: Southeast Alaska.
Primary Objective: Development of a relative abundance index for lingcod using hook and line surveys.
Description: The Department maintains a port sampling program for lingcod, collecting age, length, and weight data annually from the fishery, but there is no fishery-independent data collection for lingcod in Southeast Alaska. The lack of a biomass estimate for lingcod and poorly understood seasonal movements for lingcod creates challenges for fishery managers. Currently, the fishery is managed using guideline harvest limits (GHL) for lingcod but these were based on a review of the British Columbia fishery (Richards and Yamanaka 1992, PSARC 1992). The GHL was set at a level conservative in comparison but we do not know if the levels are appropriate. Information is urgently needed to help develop a sound management plan for this species. Interest in this resource is likely to expand because lingcod is one of the very few commercially important species that are not restricted under the federal Groundfish License Limitation plan implemented in 2001.

We propose to conduct a multi-area catch per unit effort and tagging program to develop a relative abundance index and estimate movements for lingcod populations in the eastern Gulf of Alaska. This study will be modeled after established, peer-reviewed hook and line survey methodologies for nearshore fishes (Haggarty and King 2006, Wendt and Starr 2009). To conduct this project, ADF&G staff would analyze habitat data and work with local fishermen to identify and place grid cells in a GIS in areas of high and low lingcod abundance. Once these areas are identified, ADF&G would conduct hook and line surveys in randomly selected grid cells using the methodology described by Wendt and Starr (2009). Surveys would be conducted using the ADF&G vessel or charter fishing vessels. Department staff and/or volunteer fishermen would catch fish using standardized rod and reel gear. Department staff would measure, tag, and release fish as well as monitor fishing effort and location. The short-term goal of this study would be to develop a relative index of abundance or biomass per unit effort. This analysis would be based on converting lengths of captured fish to weights using length-weight conversion

data, and eventually, build a time series of biomass per unit effort in different geographical areas. Movement data would be collected from lingcod recaptured in the commercial and sport fisheries. The long-term goal of this project would be to create a fishery population model that can be used for fishery management (Logan et al. 2005). This potential model would combine our port sampling data set (length frequency distribution, age classes, and size at reproductive maturity) with the CPUE from the proposed hook and line survey as well as estimates of the natural mortality rate and growth rate from the literature.

Addition of such a substantial project requires that additional staff be funded since current projects require all existing staff time. The addition of a full-scale stock assessment project requires study design, regular survey implementation, data analysis and reporting. Successful implementation of this project require the addition of a Biometrician I and a Fishery Biologist II, which comprises about $160.0k of the total estimated annual costs below.

Duration: A long-term stable funding source is desired
Estimated Annual Cost: $250.0

Age Laboratory Support

Location: Southeast Alaska.
Primary Objective: To improve stock assessment for groundfish fisheries.
Description: Region I Commercial Fisheries Division is responsible for research and management of groundfish in state waters, and in some cases federal waters (i.e. lingcod and black rockfish). Actively managed fisheries include sablefish in NSEI, sablefish in SSEI, Demersal Shelf Rockfish, lingcod, black rockfish, flatfish trawl fishery, Pacific cod longline fishery, miscellaneous rockfish, and geoduck fisheries. All of these fisheries require information on the biological makeup of the stocks, in particular the age distribution of the stock and catch. Aging of groundfish otoliths is a skill that takes significant training and an aptitude for detailed microscope work. Our needs for production aging have increased as fisheries have developed and expanded. Currently there is inadequate technical support for these projects at the age lab, in some cases there are two year delays in getting the otoliths processed. In addition to production age reading the lead biologists at this lab are responsible for research into age validation and developing error matrices in order for age data to be useful. In order to improve management of groundfish fisheries it is necessary to increase the productivity of the age lab without compromising quality of data. We are requesting funds to hire a Fishery Biologist I (8 mm) to work within the ADF&G Age Determination Unit (aging laboratory) and aid in our research and management programs. There would be start-up costs associated with training and equipment purchases.

Duration: A long-term stable funding source is desired.
Estimated Annual Cost: $48.0

Black Rockfish Stock Assessment

Location: Southeast Alaska.
Primary Objective: Development of production abundance estimation method for black rockfish.
Description: The department currently manages black rockfish in both state and federal waters however there is not a biomass estimate for this species. Adult black rockfish have relatively limited movements and assessment should be conducted on a management area basis. To appropriately manage these fisheries, better information on stock condition and population densities is needed. The department proposes conducting annual hook and line surveys to collect CPUE information, biological samples, and to tag and release black rockfish in order to obtain a

relative abundance index. The department would use available habitat data and work with local sport fishermen to identify likely areas of high and low black rockfish abundance. Once these areas are identified, we would conduct randomly placed, standardized surveys in each area. Surveys would be conducted using the ADFG vessel or and using department staff or volunteer fishermen to catch, tag, and release fish for us. Survey methodology would be similar to those detailed in the lingcod stock assessment description.

Duration: Three years.
Estimated Annual Cost: $70.0

Assessment of Pacific Cod, Dogfish, and Other Groundfish Species in the Internal Waters of Southeast

Location: Southeast Alaska.
Primary Objective: To conduct a tri-annual longline survey for indexing abundance of groundfish species in NSEI and SSEI.
Description: There are commercial fisheries for pacific cod, rockfish, and flatfish in internal waters of Southeast Alaska and there is significant bycatch of other groundfish species such as skates, sharks, and dogfish. There is no information available on stock status, abundance, or biological data for these species. This project would involve a tri-annual survey for groundfish from Icy Strait to Dixon Entrance. The area will be subdivided into three sections with one section being surveyed per year (each area surveyed every four years). The survey stations will be based on a stratified random sample to ensure stations are distributed over all depths. A commercial longline vessel will be contracted to conduct the survey using standardized longline gear provided by the department. When possible, fish will be tagged and released, although a sub-sample will be taken for collecting biological data. A full time biologist is needed to oversee this project and will be responsible for survey planning, fieldwork, data analysis, and authoring an annual written report explaining survey results. Recommendations for changes in management will be made when appropriate.

Duration: A long-term stable funding source is desired.
Estimated Annual Cost: $120.0 (estimated first year cost: $145.0).

Fecundity Study (GSI) of Key Groundfish

Location: Southeast Alaska.

Primary Objective: To construct Gonodal-Somatic Indexes (GSI) for key species of groundfish in Southeast Alaska for use in yield per recruit models.

Description: Key biological parameters such as growth, mortality, and fecundity can vary considerably geographically. Growth and mortality rates may be estimated from our current data using port samples and mark-recapture information. However, there is very little information available on the fecundity of groundfish residing in Southeast Alaska. This project would employ a graduate student to determine the GSI for sablefish, pacific cod, lingcod, and yelloweye rockfish from Southeast Alaska. Samples will be taken from commercial fishery landings.

Duration: Three years.

Estimated Annual Cost: $40.0 (estimated first year cost: $50.0)

MISCELLANEOUS SHELLFISH

Miscellaneous Shellfish Biometric Support

Location: Southeast Alaska.
Primary Objective: To improve the region's miscellaneous shellfish stock assessment program through increased biometric support.
Description: Additional biometric support is needed for the miscellaneous shellfish program in Southeast Alaska. Currently one Biometrician III position is funded to provide support for all shellfish fisheries in the Southeast and Yakutat areas. Due to demanding shellfish stock assessment and management programs that require intense data analysis, nearly all of this position's time is committed to those fisheries. A backlog of stock assessment modeling, analyses, and reporting has accumulated within the miscellaneous shellfish projects. We are requesting funds for a permanent full-time Biometrician I in order to improve management and assessment of the miscellaneous shellfish fisheries.

There are numerous biometric improvements that need to be made to improve the region's miscellaneous shellfish stock assessment program. The original management plans were designed with a conservative harvest rate approach because of the lack of data and information about these stocks. This approach has the benefit of a relatively low level of data analysis during early stages of data collection, but sacrifices possible benefits to fishery stakeholders if too conservative. Over the past 10 years data has accumulated and analysis that could refine our management approach has been neglected. For example, analysis of a building sea cucumber dataset could determine the effects of exploitation at the current harvest rate, or if current sampling design must be modified to make such determinations. The red sea urchin dataset is another example where biometric analysis is needed. Modeling of data from an on-going study of urchin growth rates would help determine if currently used harvest rates are sustainable. In general, all miscellaneous shellfish projects need biometric review to help determine if the current stock assessment approach is adequate and capable of providing the information necessary to properly manage these fisheries.

Duration: A long-term stable funding source is desired.
Estimated Annual Cost: $90.0

Geoduck Aging

Location: Southeast Alaska
Primary Objective: To obtain an age frequency for geoduck clam stocks in Southeast Alaska.
Description: An extensive aging program in Southeast Alaska, with broad geographic coverage, is needed to assess growth and mortality parameters and to reconstruct an historical time series of year-class strength. Biometric involvement is needed to structure and define modeling requirements. After these requirements have been estimated, collection and aging of geoduck clams should be completed as soon as possible. Aging requires the collection of shells (probably during the fishery but also, possibly through contracts and Department surveys) and technician training with validation of aging techniques. The department's aging lab has completed approximately 500 geoduck ages collected from a variety of locations in 1998. This preliminary data needs to be expanded. Funding would pay for five months for a FWT IV stationed at the department's aging lab to determine and validate geoduck ages ($25.0k), and vessel time, sea duty pay and equipment to initiate a sample collection program ($25.0k)

Duration: Two years.
Estimated Cost: $50.0

Geoduck Recruitment and Control Studies

Location: Southeast Alaska
Primary Objective: An extensive recruitment program examining the dynamics of harvested geoduck populations.
Description: Surveys conducted by the Department should be expanded to vigorously survey beds currently in recovery and those beds nearing their threshold levels. Additionally, geographic differences in recruitment (and recovery) should be examined, as this could be a major consideration in the identification of metapopulations and the boundaries of management units. In addition, funding would pay for surveys of geoduck control areas. Control areas are sites that have never been opened to commercial harvest and should be monitored to help evaluate the effects of exploitation and environmental variability in these and other areas.

Duration: Long-term funding is desired.
Estimated Annual Cost: $50.0

Abalone Stock Assessment Method

Location: Selected abalone stocks in Southeast Alaska

Primary Objective: Evaluate methods for determining abalone densities in Southeast Alaska with 'an eye' toward estimating stocks.

Description: The department currently has no population estimates of abalone stocks in Southeast, but we believe that they remain at low levels. The department currently has no system in place to objectively determine if stocks are increasing or continuing to decrease, other than subjective observations. At a minimum, several days of survey time per year could be used to evaluate abalone survey methods.

Duration: 2 Years; annual surveys of approximately 3 days each year.
Estimated Annual Cost: $15.0

SHELLFISH

Southeast Alaska Personal Use Shellfish Management Project Fishery Biologist II*

Location: Region wide.

Primary Objective: To assist with management of the region's personal use shellfish stocks.

Description: Currently, the Shellfish Management section consists of one Fishery Biologist III (project leader), one Fishery Biologist II and one Fish and Wildlife Technician IV. All shellfish management responsibilities must be met by this staff. This includes fisheries for red king crab, golden king crab, Tanner crab, Dungeness crab, beam trawl shrimp, and Yakutat scallops. Each of these fisheries requires monitoring fisheries, tracking and storing catch data, working with stakeholders on management, developing management plans, summarizing management actions and seasonal information and answering questions from the public. Additional staffing is needed to support management of the regions personal use fisheries, especially the complex personal use red king crab fishery located in the Juneau area.

Personal use of shellfish take is poorly understood throughout the region. The addition of a full time personal use Fishery Biologist II position would provide oversight and direction of personal use fishery management in the region for all shellfish species including crab and shrimp harvests. Duties for this position would initially be to develop and implement a regional personal use permitting and reporting system as is described further below under the Southeast Region Shellfish Personal Use Harvest Documentation and Management Program. Long term duties would be to oversee active management of the personal use shellfish fishery for the region.

Duration: This project requires stable long-term funding because it is the salary support for a professional biologist to implement a regional personal use permitting and reporting system throughout Southeast Alaska.
Estimated Annual Costs: $85.0

Southeast Alaska Shellfish Research Project Fishery Biologist II or Biometrician I**

Location: Region wide.
Primary Objective: To assist with stock assessment for the region's shellfish stocks and assist with other shellfish research needs.
Description: Currently, research staffing in the Shellfish section consists of one Fishery Biologist III (project leader for crab species), one Fishery Biologist II (project leader for shrimp species) and one Fishery Biologist II (Golden King crab observer program coordinator and crab stock assessment assistant). All shellfish research responsibilities are expected to be met by this staff. This includes stock assessment surveys for red king crab, Tanner crab, and spot/coonstripe shrimp, along with a golden king crab observer program. Each of these stock assessment programs would benefit by having dedicated personnel. The current staffing level of the Shellfish Research section is inadequate to maintain these stock assessment programs and fulfill other obligations, such as producing timely reports on the results of those surveys.

In addition just one position is funded to provide biometric support for all shellfish and dive fisheries in the Southeast and Yakutat areas. A backlog of stock assessment modeling, analyses, and reporting is accumulating. A major stock assessment project for pot shrimp is now in the phase of project development and requires a significant amount of population modeling and harvest strategy determination. Other existing, new projects requiring biometric support are the onboard fishery sampling programs for golden king crab, Tanner crab and beam trawl shrimp. Additional biometric support for future, high priority studies include development and analysis of a habitat-based restratification program for Tanner crab and shellfish, stock assessment programs for Southeast Alaska golden king crab fisheries and Yakutat area Dungeness and Tanner crabs. There is much cross over between the research biologist and biometrician position so the addition of either could strongly support and ensure a more complete and sound shellfish research program.

Duration: This project requires stable long-term funding because it is the salary support for a professional biologist.
Estimated Annual Costs: $90.0

Southeast Region Shellfish Personal Use Harvest Documentation and Management Program*

Location: Southeast Alaska and Yakutat.

Primary Objective: To collect personal use shellfish harvest information from all major harvest areas/communities in the region.
Description: Accurate harvest records are vitally important in fisheries management and the Commercial Fisheries Division goes to great lengths to obtain all catch information for commercial shellfish fisheries. Presently, there is a very limited program for documenting personal use catches. Several personal use fisheries have grown in recent years, and total mortality from those fisheries has become significant relative to total commercial harvests.

Presently, our knowledge of harvest by personal use and subsistence fishers of commercially important species of shellfish in the Southeast Alaska and Yakutat Areas are extremely limited. Our data is limited to a red king crab permit requirement in the Juneau area, and creel census data and mail-out survey data obtained by the Sport Fish Division from major communities in Southeast. The creel census primarily occurs during the salmon season, so harvesters are typically not interviewed during the late fall–spring season. A key component of population modeling requires knowledge of harvest by all user groups (known mortality). This was made clear by a scientific panel that was charged with reviewing the region's red king crab stock assessment program. Among the panel's recommendations was that a comprehensive data collection system be initiated for personal use crab harvest in Southeast Alaska. This project would fund a comprehensive, region-wide shellfish harvest survey to increase the department's understanding of the magnitude of personal use shellfish harvest and the impact of that harvest on the region's shellfish stocks.

This effort would be contingent upon successful funding for the Personal Use Shellfish Management Project Biologist listed above.*

Duration: A long-term stable funding source is desired.
Estimated Annual Costs: $75.0 first year for infrastructure costs and $15.0 long term for system maintenance and associated regional travel support.

Southeast Area Dungeness Crab Stock Assessment and Soft Shell Monitoring**

Location: Region wide.

Primary Objective: Reinitiate for three years the Southeast Alaska Dungeness crab survey program that was cancelled in 2005 to enhance the department’s survey data time series and life history research in support of understanding the sensitive summer molt period for Dungeness crab. Field work would be conducted to assess male shell hardness with a durometer, while laboratory work would assay Dungeness crab blood and determine the level of molt hormones seasonally at several survey locations throughout Southeast Alaska. In addition, these funds would also support inseason on the grounds sampling of soft-shelled crab harvested during the start of the summer fishery. Together this information would inform season start date and duration periods for the Dungeness crab fishery throughout Southeast Alaska.

Description: The Dungeness crab fishery in Southeast Alaska continues to intensify, and the department has in the past worked with an industry task force and the Alaska Board of Fisheries (Board) to develop fishing strategies to minimize risks of overexploitation and stock depletions. The department initiated a pilot program in FY01 to estimate abundance and exploitation rates of Dungeness crab in two major fishing areas of Southeast, near Petersburg and Wrangell. In FY02, the preseason stock assessment survey was expanded to additional fishing grounds in northern

Southeast, and added post-season surveys in both southern and northern Southeast. Post-season surveys were eliminated due to budget shortfalls in FY04 and the entire program was cancelled in FY05 (2005 field season) due to budget shortfalls. In conjunction with the survey efforts, the department had initiated basic life history research to estimate growth rates, molting increments, molt timing and natural mortality rates. A tagging study was implemented to determine molt increment and molting probability in Dungeness crab. Additional pot soak time and mesh selectivity studies are needed for interpreting initial survey results.

This proposal would reinitiate for three years the Southeast Alaska Dungeness crab survey program that was cancelled in 2005 to enhance the department's survey data time series and life history research in support of understanding the sensitive summer molt period for Dungeness crab. Field work would be conducted to assess male shell hardness with a durometer, while laboratory work would assay Dungeness crab blood and determine the level of molt hormones seasonally at several survey locations throughout Southeast Alaska. In addition, these funds would also support inseason on the grounds sampling of soft-shelled crab harvested during the start of the summer fishery. Together this information would inform season start date and duration periods for the Dungeness crab fishery throughout Southeast Alaska.

A study to monitor soft shell and handling mortality could be useful to the Board for making decisions about allowing commercial fisheries during sensitive times of year. Since the 2006 BOF meeting a number of proposals have been submitted to open Districts 1 and 2 during summer months rather than fall and winter. Similar proposals have been submitted for other areas within Southeast Alaska as well. A more thorough investigation of incidence of soft shell among areas, months and years is necessary to be conclusive and to aid the Board in addressing any regulatory changes.

Such a project could not be initiated without additional staff as requested for above, and also sea duty pay, vessel charter, and operational funds.**

Duration: Three years.
Estimated Cost: $75.0 annual for a three-year period.

Tanner Crab Population Independent Verification

Location: Northern Southeast Alaska
Primary Objective: To estimate Southeast Alaska Tanner crab population size independently of current survey and modeling methods to evaluate accuracy of current methods.
Description: The department conducts an annual stock assessment survey to help evaluate overall level and condition of the Tanner stock in Southeast Alaska. However, the crab industry in Southeast Alaska has repeatedly criticized the department's survey methods, claiming that the results indicate a population size that is much lower than what is observed by the fleet. There may be several alternative methods that could produce population estimates that are independent of the department's annual stock assessment survey and subsequent catch-survey analysis (CSA). One way to verify the accuracy of current estimates is to conduct a mark-recapture experiment. This would could produce an estimate of population size or an estimate of exploitation rate, by examining the proportion of marked crab that are caught in the commercial fishery relative to the number that are released during a marking event just prior to the fishery. Another method is use of a remotely operated vehicle (ROV) to directly observe crab in situ, produce estimates of density, and provide an area-swept population estimate. Another alternative is to conduct surveys

prior to and just after a commercial fishery to obtain data on the change in ratio of legal or mature crab, which can be modeled to estimate population size. Finally, current survey methods and use of CSA could be maintained, but with a much higher sampling rate. Although the last alternative would not be independent of current methods, it could produce results based on more thorough coverage of the sampling area, which may directly address the specific industry complaint that segments of the crab population are missed during the regular survey. At this time, it is clear there is a need to initiate a project to verify current methods in order to gain the industry's confidence in the department's survey. It is not yet clear which method would be best to achieve the objective. Costs of one of the alternatives are expected to include vessel time, tags or ROV, travel, premium pay, and rewards for tag returns. The number of areas for which the project would be conducted tailored to fit the budget.

Duration: Two years
Estimated Costs: $75.0

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